



The original GroundLink was developed for general aviation and commuter airlines to provide pilots access to the NAS through their communications radio with an interface to the public telephone network. Using the GroundLink system, the pilot keys the mic on the aircraft's communication radio, signaling the system to call the appropriate air traffic control (ATC) agency. The pilot then talks directly with ATC to receive the necessary instructions without leaving the aircraft. Before the development of this type of system, the pilot had to call ATC using a public telephone. GroundLink serves as an alternative to dedicated air/ground voice facilities that may be underused or not economically justifiable.

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BENEFITS TO THE NAS AND THE PILOT



ENHANCES FLIGHT SAFETY

GroundLink allows ATC to enhance the safety of aircraft movement by increasing the efficiency of the use of airspace surrounding outlying airports. GroundLink aids pilots in easily obtaining IFR clearances prior to departure. The public telephone method of obtaining the clearances takes time, is usually inconvenient, and often encourages the pilot to depart without

having obtained a clearance. This can lead to dangerous operating conditions.

GroundLink also provides timely cancellation of the IFR flight plan upon landing. Pilots can cancel as soon as they clear the active runway, thereby quickly opening the airport for the next aircraft.

Thus, GroundLink provides ATC with greater control of the airspace. The system also enhances the controller's situational awareness by providing near-term notification of a pending departure.

COST-EFFECTIVE

GroundLink is extremely cost-effective to the national airspace system as an alternative to dedicated remote transmitter/receiver facilities. It has been estimated that the acquisition of this type of system will be approximately 15% of the cost of the RCO. Annual operating expenses are nothing more than a telephone line and electricity. This equates to a five-year cost saving of 75% or more over a dedicated facility.

EFFICIENTLY USES AIRSPACE

Procedures currently call for all airspace surrounding an airport to be sterilized when a clearance has been issued with a release (void) time. This means that no other approaching or departing aircraft is allowed to be cleared into that airspace until a positive position is reported from the cleared aircraft. The amount of time that elapses from release until communications can be established with that aircraft can be extremely long, often ten to thirty minutes. GroundLink can reduce this time from ten minutes or greater to two or three minutes, allowing ATC to open the airspace for other operations, and eliminating the need for holds or other delays for aircraft.

THE NEXT GENERATION OF GCOs

The Only Voice Activated and Voice Recognition Ground Communications Outlet

The original analog GroundLink was developed for general aviation and commuter airlines to provide pilots access to the NAS through their communications radio with an interface to the public telephone network. With the development of the digital GroundLink VA system, this process has become significantly more user-friendly.

The digital system provides the ability to add state or airport supplied information to each GroundLink VA and user access to state-supplied information. As an example, state or airport supplied information may be inserted by the airport via telephone (with the use of a PIN) or the exchange of Flash Cards.

AVTECH Marketing, Inc. supplies the GroundLink VA system as a complete product with all hardware, software, data communications and maintenance.

TO CALL AIR TRAFFIC CONTROL CENTER

1. Click the mic four times: the system dials ATC.
2. Key the mic and say "call clearance delivery": the system automatically dials ATC.

The system dials the number and establishes communications between the facility and the aircraft. The pilot can then obtain or cancel an Instrument Flight Rules (IFR) clearance.

NEW FEATURES FOR GROUNDLINK VA

- Programmable modes beyond two choices, i.e. ATC, FSS, 911, taxi and fuel service.
- Custom programmable messages for airport-related information.
- Software update via modem.
- Call progress that handles busy and line-in-use.
- Pilot can abort operation, after sequence has started, with 3 clicks of the mic.
- System responds to either voice or key clicks.



THE NEXT GENERATION OF GCOs

(continued)

Each of these functional areas is developed in a modular fashion to facilitate expandability and modification without affecting the other functional areas. This not only increases system flexibility and decreases ongoing development time, but increases system reliability as well by decoupling the performance of each function from the others in an operational environment.

SOFTWARE

The software component of GroundLink VA represents the largest single enhancement over the current GroundLink system. Advancements in the capabilities of the digital system and the state-of-the-art software development system have allowed development of a very powerful set of software capabilities at a reasonable cost. The GroundLink VA software has been developed using Object Oriented Programming techniques, allowing a modular and flexible system, which facilitates customization and can be quickly adapted to next generation computer hardware, operating systems, and communications technology. All GroundLink VA software is designed to operate under the Windows environment ensuring long-term supportability and compatibility.

AUTOMATIC RADIO TEST

GroundLink is an interactive system. The simple act of using the system verifies that your aircraft radio is working.

EASY IMPLEMENTATION

As with the original GroundLink, no changes are required to equipment at the ATC facility or in the aircraft.

DOCUMENTATION

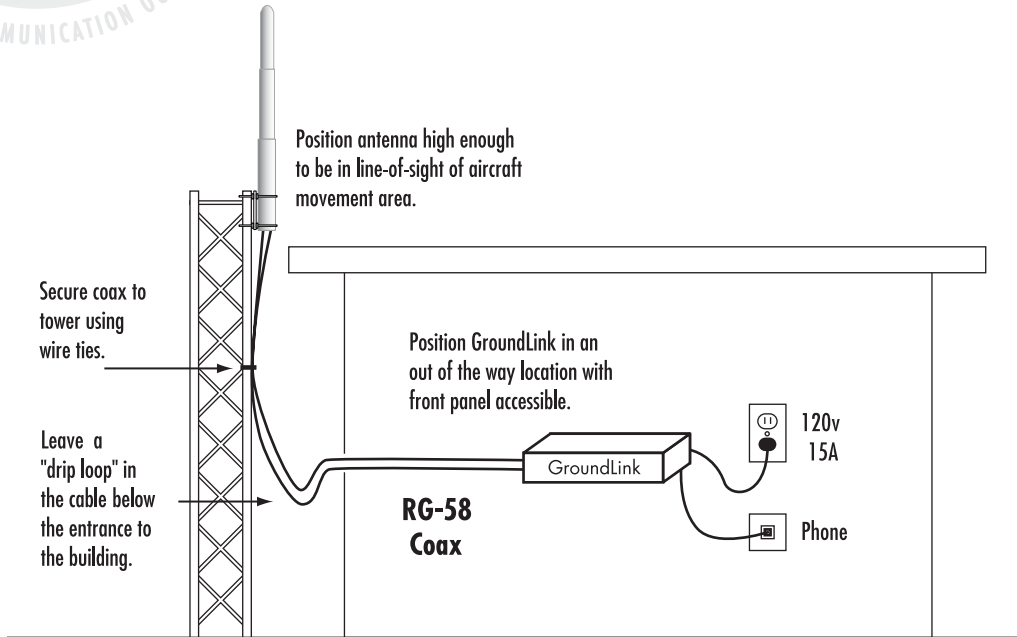
The following documentation will be provided with each system:

- User's Guide – *Detailed description of all system features and functions*
- Quick Reference Guide – *"How to" for frequently used features*

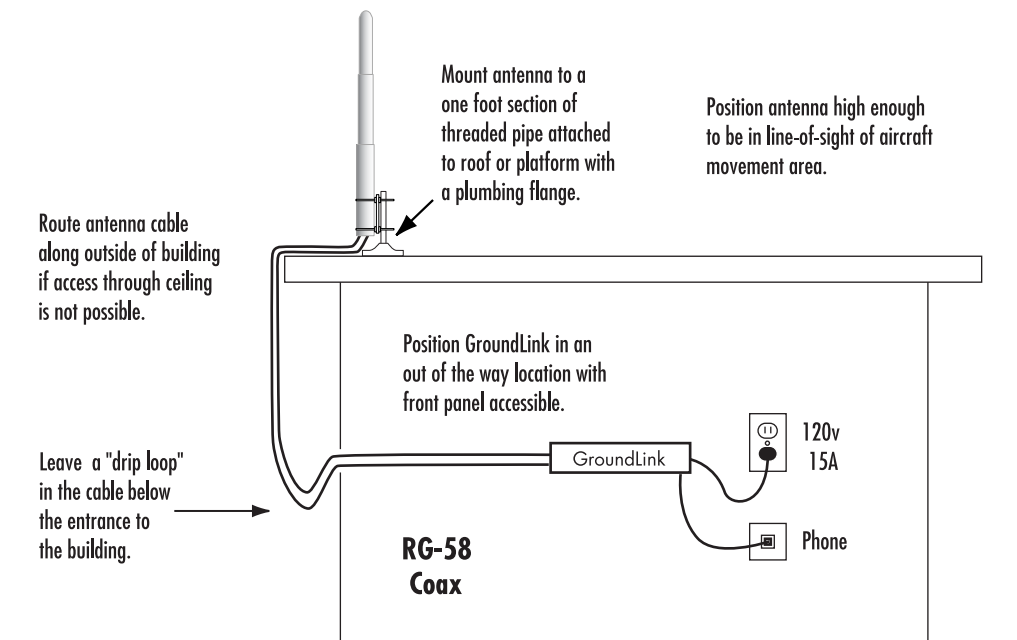


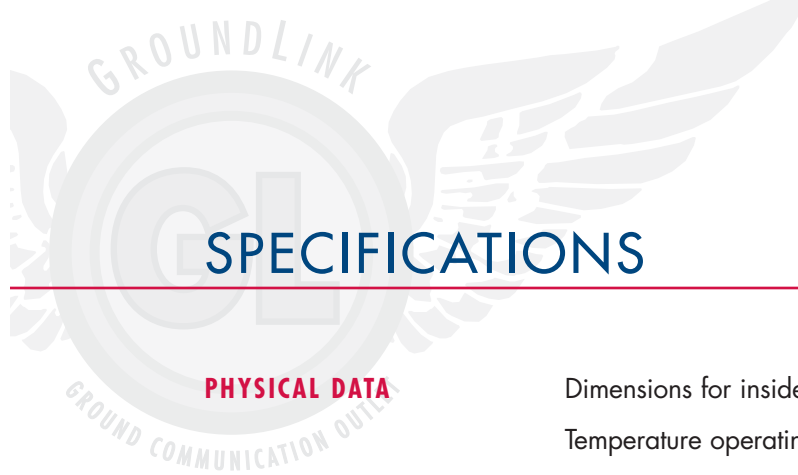
INSTALLATION QUICK REFERENCE

INSTALLATION WITH EXISTING ANTENNA TOWER



INSTALLATION WITH ROOF-MOUNTED ANTENNA





SPECIFICATIONS

GroundLink VA

The Next Generation of GCOs

PHYSICAL DATA

Dimensions for inside unit: 3.5"h x 8"d x 19"w
Temperature operating range: 0 to +40 Degrees C
External antenna: 6 feet vertical height
Antenna cable: RG58, max length 100 feet

RECEIVER AND TRANSMITTER

Frequency setting: 118.0 to 136.975 MHz in 8.33 kHz (meets future channel standards)
Frequency stability: 5 PPM
Adjacent channel isolation: 80 dB, prevents false keying of GroundLink VA
Sensitivity: 0.3 uV for 10 dB SN ratio
Squelch range: 0.2 uV to 20 uV, not used in VA mode
Transmit power: 1 Watt PEP
Modulation: Double sideband with carrier, 80% modulation limit
Channel selectivity: 8.33 kHz
Audio range: 300 to 3,500 Hz, matches telephone line standards

PROCESSOR AND INTERFACE COMPONENTS

Digital Signal Processor (DSP): Analog Devices ADSP-2185L 50MIPS
Control processor: Intel 80386SX 32-Bit Microprocessor with peripherals
Control program: Custom operating system with radio, telephone, and voice firmware
Voice processing: 16 bit A to D CODEC
Voice coding: 16 bit coding at 11,000 samples per second
Voice bit rate: 88,000 bits per second
Stored voice format: 11000 Bytes per second of speech 16 bit PCM WAV format
16 Megabytes standard OS, Firmware Program, and Voice Messages stored on Compact Flash Card



SPECIFICATIONS

GroundLink VA

(continued)

ANTENNA

Omnidirectional Antenna System
60 dB of active radio TX signal nullification
80 dB of isolation for VA carrier detection of pilot keying radio during TX
Antenna gain: 3 dBd
Lighting protection: 5 Joules at 600 uSec duration
Meets FCC requirements

TELEPHONE INTERFACE

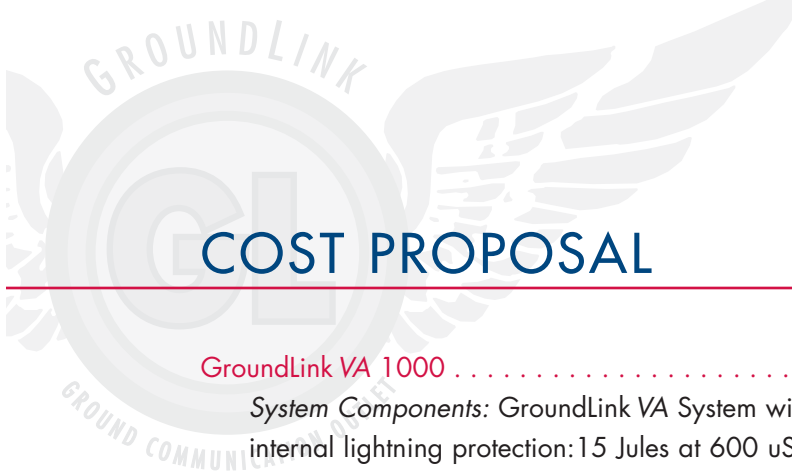
Dialing: Pulse or tone
Call progress: Dial tone, ring, busy, and fast busy
Answer supervision: Line current, or voice detection
Telephone line detection: ring and loop current detection
Telephone frequency range: 300 to 3000 Hz
Lighting protection: 5 Joules at 600 uSec duration

PROGRAMMING FEATURES

Firmware program allows custom scripts for each end user
Interactive operation with pilot using Voice Activation and menu options
Supports interactive operation with two key clicks of pilot transmitter
Supports Legacy 4 and 6 transmit key and two number dialing
Aborts present activity with 3 or more transmit keys

ADDED BENEFITS OF DIGITAL OVER ANALOG SYSTEMS

| FEATURE | DIGITAL GROUNDLINK VA | BENEFIT |
|---|---|---|
| Fast Click | Click mic just like remote lighting | Pilot requested. Quickly connects to dialed numbers. |
| System responds to either voice request or key clicks | Only available on the Digital System | User-friendly for pilots that have used analog systems |
| Call-back capability | Standard | ATC can call aircraft on the ground. Pilot answers by keying mic when system rings or ATC can insert PIN and do a general broadcast |
| Radio test procedure | Standard | Pilot can test the communications radio before flight-it is an interactive system |
| Records number of usages | Optional feature on the Digital System | Airport has a report on the usage of the system |
| Automatic gain level on phone | Standard | Automatically adjusts audio level on phone line to compensate for weak telephone output |
| Lightning protection | 5 Joules at 600 uSec duration for telephone and antenna. | Added protection for the system |
| Frequency range | 118.0 to 136.975MHz in 8.33 kHz | Meets future channel standards |
| Adjacent channel isolation | 80 dB | Prevents false keying of the GroundLink VA |
| Receiver sensitivity | .12 uV for 6dB S + N/N | High-quality sound reception and transmission |
| Access security | Standard PIN number is used | Only authorized personnel can access the system |
| Programmable general information broadcast | Standard PIN number is used | Custom programmable messages can be broadcast periodically for airport related information |
| Programmable pulse or tone | Standard | Adaptable to all phone systems |
| Multiple phone numbers | Programmable modes beyond two choices, i.e., ATC, FSS, 911, taxi fuel, etc. | Can be customized to the airports needs |
| Maintenance | None required but a guaranteed maintenance agreement available | GroundLink will maintain or replace items that may fail for a yearly fee |
| Warranty | 1 year | Guaranteed maintenance agreement available |



COST PROPOSAL

GroundLink VA

GroundLink VA 1000 \$10,533.00

System Components: GroundLink VA System with internal lightning protection: 15 Jules at 600 uSec
GroundLink VA UV protected fiberglass Antenna Package & coaxial cable

Sales Tax: sales tax is not applicable for systems sold outside the state of Minnesota.

On-site GroundLink VA installation \$1,800.00

Delivery No Charge

GroundLink VA is a complete system. The owner supplies only the telephone and electrical connection.

GCO REQUIRED FORMS

You will need to submit the following forms: FAA 7460-1, Notice of Proposed Construction or Alteration and the FCC 601, FCC Application for Wireless Telecommunications Bureau Radio Service Authorization. As a service to our clients, AVTECH Marketing, Inc. will assist you in the submittal of these documents or submit these forms for you. This is a no-charge item.

TERMS

All pricing F.O.B. Avtech Marketing, Inc., Minneapolis, Minnesota. Pricing exclusive of all applicable state and local taxes. Payment terms: 1/2 down with order, balance due upon installation. All parts and labor warranted for one year from date of installation.

WARRANTY

Avtech Marketing, Inc. manufactures its products to the highest quality standards. Therefore, Avtech is able to warrant its products to be defect-free for a period of one year under normal use and care, from date of installation. During this period, Avtech will repair or, at our option, replace free-of-charge to the original purchaser any product found to be defective. Damages resulting from freight (claimed or unclaimed) accident, lightning strikes, alteration, tampering, misuse, negligence or abuse void this warranty.

Pricing subject to change without notice.